

for protection of the engine fuel system against foreign particles in the fuel. The applicant must show:

(i) That foreign particles passing through the specified filtering means do not impair the engine fuel system functioning; and

(ii) That the fuel system is capable of sustained operation throughout its flow and pressure range with the fuel initially saturated with water at 80 °F (27 °C) and having 0.025 fluid ounces per gallon (0.20 milliliters per liter) of free water added and cooled to the most critical condition for icing likely to be encountered in operation. However, this requirement may be met by demonstrating the effectiveness of specified approved fuel anti-icing additives, or that the fuel system incorporates a fuel heater which maintains the fuel temperature at the fuel strainer or fuel inlet above 32 °F (0 °C) under the most critical conditions.

(5) The applicant must demonstrate that the filtering means has the capacity (with respect to engine operating limitations) to ensure that the engine will continue to operate within approved limits, with fuel contaminated to the maximum degree of particle size and density likely to be encountered in service. Operation under these conditions must be demonstrated for a period acceptable to the Administrator, beginning when indication of impending filter blockage is first given by either:

(i) Existing engine instrumentation; or

(ii) Additional means incorporated into the engine fuel system.

(6) Any strainer or filter bypass must be designed and constructed so that the release of collected contaminants is minimized by appropriate location of the bypass to ensure that collected contaminants are not in the bypass flow path.

(c) If provided as part of the engine, the applicant must show for each fluid injection (other than fuel) system and its controls that the flow of the injected fluid is adequately controlled.

(d) Engines having a 30-second OEI rating must incorporate means for

automatic availability and automatic control of a 30-second OEI power.

[Amdt. 33-6, 39 FR 35466, Oct. 1, 1974, as amended by Amdt. 33-10, 49 FR 6851, Feb. 23, 1984; Amdt. 33-18, 61 FR 31328, June 19, 1996]

#### § 33.68 Induction system icing.

Each engine, with all icing protection systems operating, must—

(a) Operate throughout its flight power range (including idling) without the accumulation of ice on the engine components that adversely affects engine operation or that causes a serious loss of power or thrust in continuous maximum and intermittent maximum icing conditions as defined in appendix C of Part 25 of this chapter; and

(b) Idle for 30 minutes on the ground, with the available air bleed for icing protection at its critical condition, without adverse effect, in an atmosphere that is at a temperature between 15° and 30 °F (between -9° and -1 °C) and has a liquid water content not less than 0.3 grams per cubic meter in the form of drops having a mean effective diameter not less than 20 microns, followed by a momentary operation at takeoff power or thrust. During the 30 minutes of idle operation the engine may be run up periodically to a moderate power or thrust setting in a manner acceptable to the Administrator.

[Amdt. 33-6, 39 FR 35466, Oct. 1, 1974, as amended by Amdt. 33-10, 49 FR 6852, Feb. 23, 1984]

#### § 33.69 Ignitions system.

Each engine must be equipped with an ignition system for starting the engine on the ground and in flight. An electric ignition system must have at least two igniters and two separate secondary electric circuits, except that only one igniter is required for fuel burning augmentation systems.

[Amdt. 33-6, 39 FR 35466, Oct. 1, 1974]

#### § 33.71 Lubrication system.

(a) *General.* Each lubrication system must function properly in the flight attitudes and atmospheric conditions in which an aircraft is expected to operate.

(b) *Oil strainer or filter.* There must be an oil strainer or filter through which all of the engine oil flows. In addition: